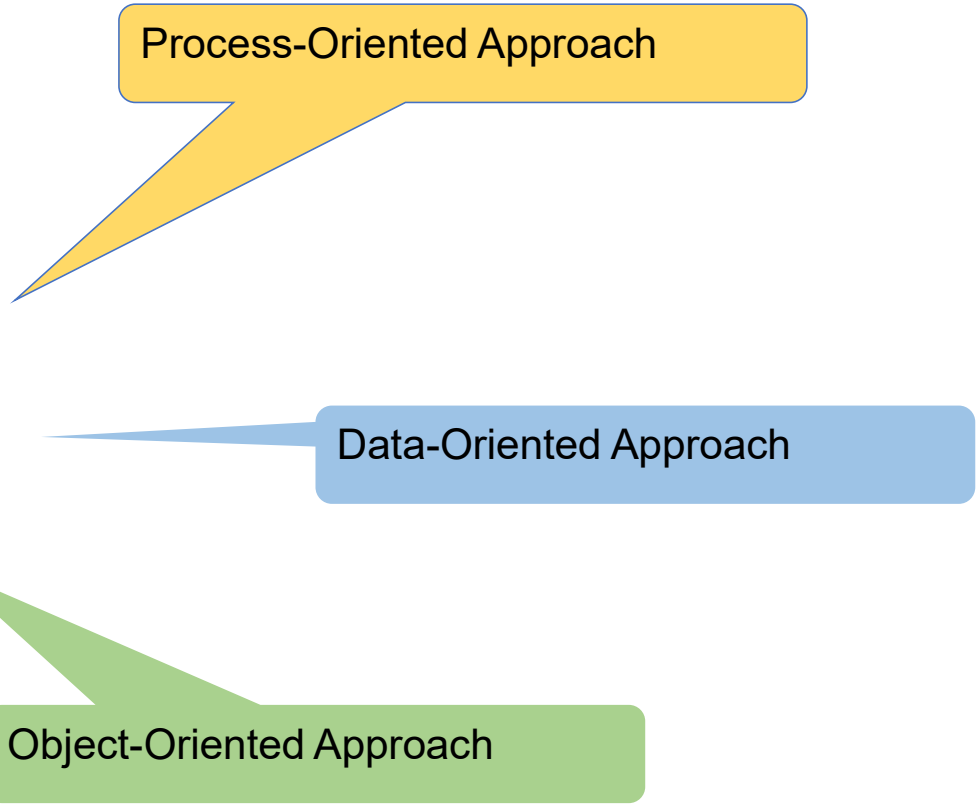
Chapter

Modeling Data in the Organization

System Modeling



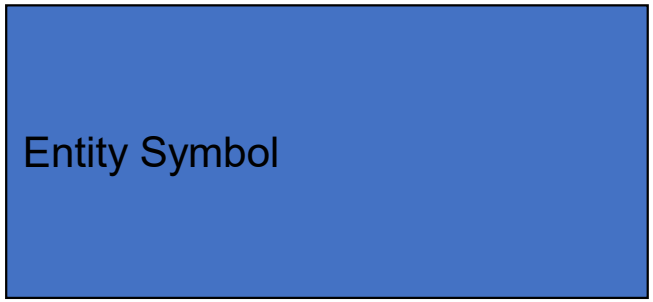
Entity Relationship (E-R) Model

Logical representation of the data.

- A detailed, logical representation of the data for an organization or business area
- Expressed in terms of Entities, Relationships and Attributes
- E-R Diagram: A Graphical Representation of an E-R Model

Entity

- An object or concept that is important to the business and the organization chooses to record data



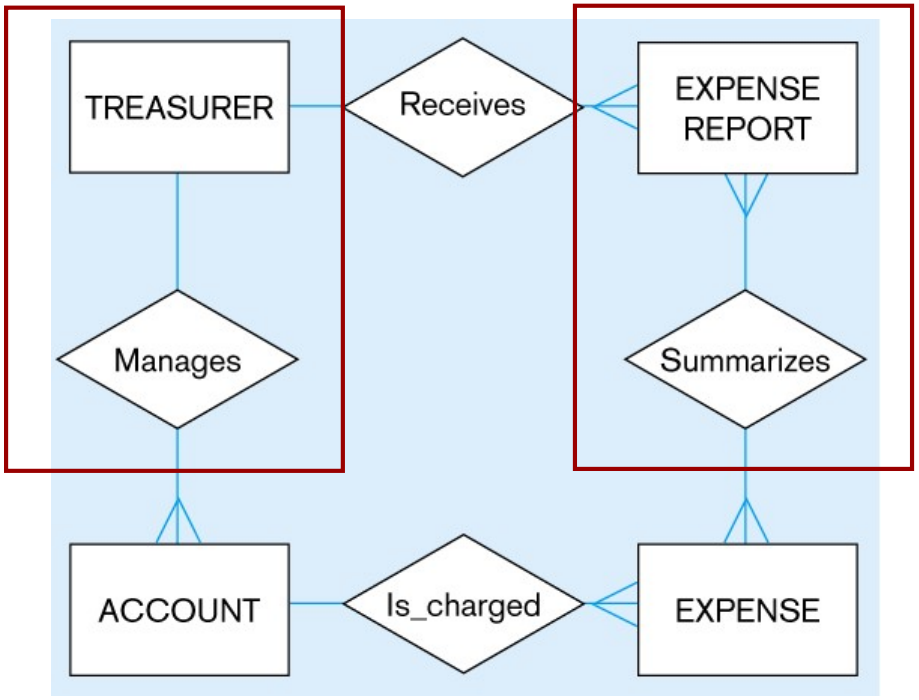
Important object or concept that is related wih business and organization wants to record the data called entity.

What Should an Entity Be?

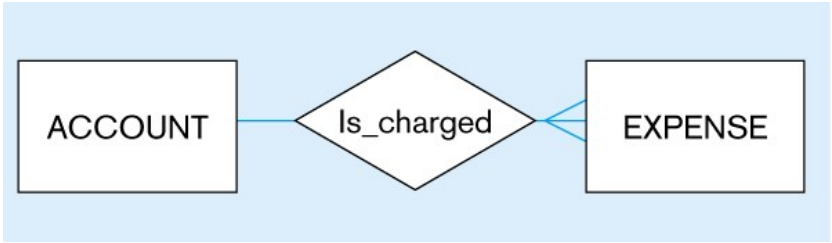
- SHOULD BE:
  - An object that will have many instances in the database
  - An object that will be composed of multiple attributes
  - An object that we are trying to model
- SHOULD NOT BE:
  - A user of the database system
  - An output of the database system (e.g. a report)

Inappropriate entities

System user



System output



Appropriate entities

Terms

Entity Instance: Single occurrence of an entity type.

Attribute: Property or characteristic of an entity that is of interest to the organization.

Composite Attribute: An attribute that can be broken down into its component parts

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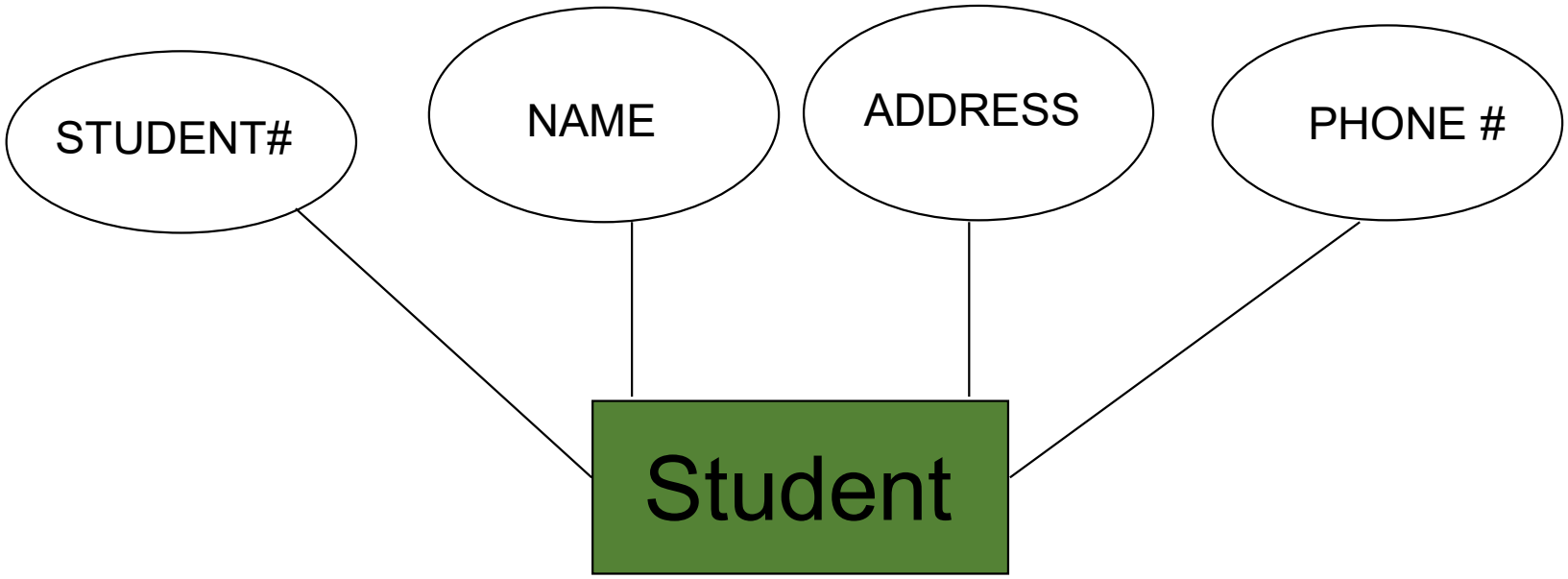
More Terms

Single Attribute: Cannot be broken down into smaller components

Multivalued Attribute: May take on more than one value for a given entity instance

Derived Attribute: Values can be calculated form related attribute values

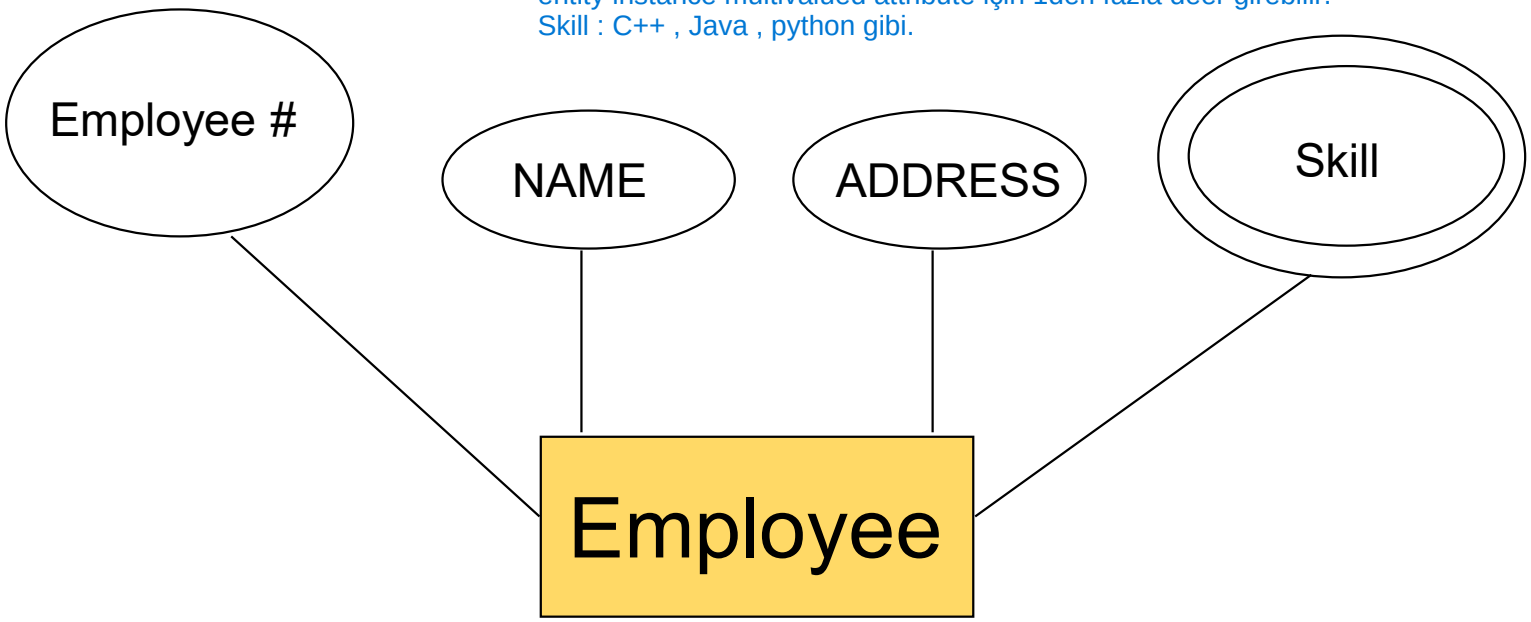
Simple Example of Entity



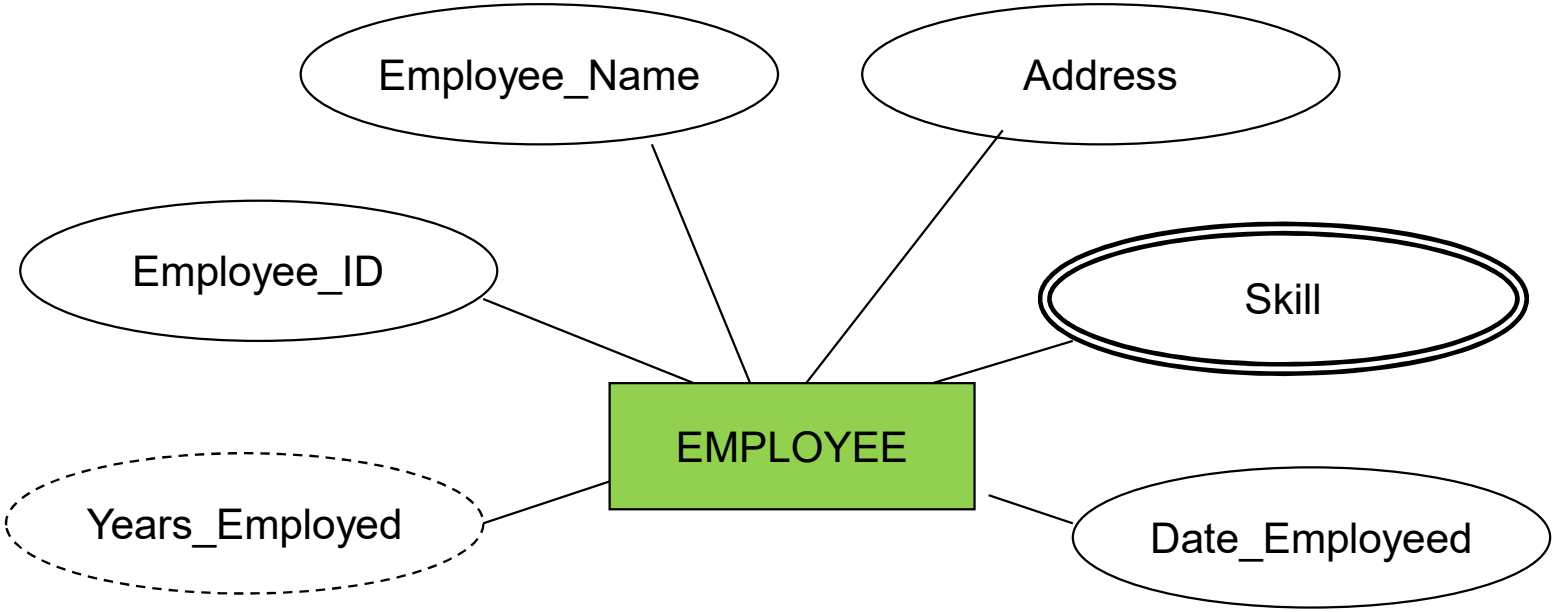
Multivalued Attributes

An attribute that can have more than one value for each entity instance

entity instance multivalued attribute için 1den fazla deer girebilir.
Skill : C++ , Java , python gibi.



Example (Multi/Derived)



Attributes:
1) Single Valued
2) Multi valued -> Bir attirbute birden fazla deer alabiliyorsa : Skill - Python,Java, C++
3) Derieved -> farkl bir attribute üzerinden hesaplanabilen attributelar (years_employed = currentDate- Date_Employeed)
4) Composite Attribute: An attribute that can be broken down into smaller, meaningful sub-parts.
Consider the attribute Address. It can be split into:
Street: "123 Main St"
City: "New York"
State: "NY"
Postal Code: "10001"

Example (Entity Type)

Entity Type: **Employee**

Attributes:
- Employee #
- Name
- Address
- City
- State
- Zip
- Year Hired
- Birthdate

Instance of Employee

Employee #	642-17-8360
Name	Michelle Brady
Address	100 Pacific Ave
City	San Francisco
State	CA
Zip	98317
Year Hired	1989
Birthdate	6-19-64

More Terms

Identifier: an attribute (or combination of attributes) that uniquely identifies each instance of an entity type.

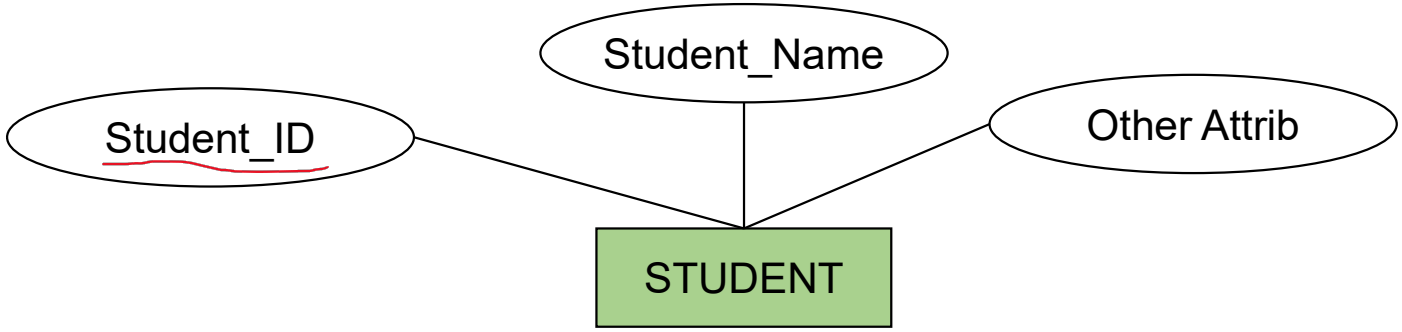
Composite Identifier: An identifier that consists of a composite attribute

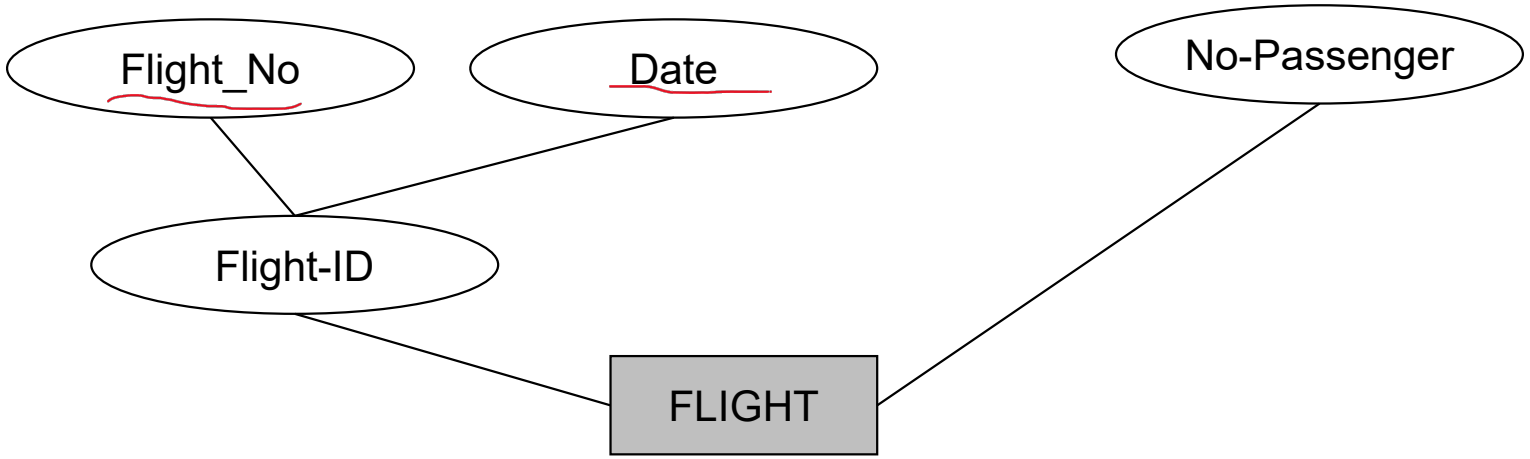
Flight_ID is a composite identifier because it is a key made up of multiple attributes (Flight_No and Date) to uniquely identify a record in the FLIGHT entity. However, Flight_ID itself is not a composite attribute because it doesn't represent a logical grouping of related sub-parts (e.g., like an address). Instead, it is a combination of two simple attributes that act as a primary key.
Address:

Address can be broken down into:
Street
City
State
Zip Code
Full Name:

Full Name can be broken down into:
First Name
Middle Name
Last Name
Composite attributes represent a logical grouping (e.g., address, name) where the sub-parts are inherently related and not necessarily identifiers.

Simple and Composite Identifier





Definitions

- Primary Key - a data item that is unique to each record
- Compound Key - primary key consisting of multiple fields
- Keys are used to relate several tables together.
- Foreign Key - a field in one table that is a primary key to another table.

Student

Student_ID	Name	Age
101	Alice	20
102	Bob	22
103	Charlie	19

StudentID primary key. it uniquely identifies each student in the table.

OrderDetails

Order_ID	Product_ID	Quantity
1	101	2
1	102	1
2	101	5

OrderID and ProductID together a compound key

Characteristics of Identifiers

- Use attribute(s) that will not change over time
- Must never be empty “null”
- Avoid intelligent keys: e.g. containing locations or people that might change.
- Substitute new, simple keys for long, composite keys

Relationships

An association between instances of one or more entity types that is of interest to the organization (VERB)

Relationship

- Associations between entities captured by business rules
  - each customer places any number of customer orders
  - each customer order is placed by exactly one customer